

MARYLAND DEFENSE FORCE ESTABLISHES AN ENGINEER CAPABILITY

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The Maryland Defense Force's motto of, "*OFFICIO VOCANTE PARATI*" translates from the Latin to, "*Ready When Called.*" To fulfill this motto in response to the War on Terrorism, the MDDF transitioned from an organization which supplied additional military manpower to the State of Maryland, to an organization that is laser beam focused to excel as a force multiplier through providing professional services to complement and supplement the existing technical skills, knowledge and experience of the other three "sister" pillars of the Maryland Military Department (MD MilDep) (Smalkin, 2007). These pillars consist of the Maryland Army National Guard (MDARNG), Maryland Air National Guard (MDANG), Maryland Emergency Management Agency (MEMA) and Maryland Defense Force (MDDF). Before the establishment of an Engineer Corps in the MDDF, other professional directorates had been established, such as the Medical Regiment (Nelson, et al., 2006 & 2007; Tuxill, 2006), Chaplain Corps, Judge Advocate General, and Finance Corps (Tuxill, 2005). The complete success of these directorates in supporting the MD MilDep led to a desire to expand additional technical support to be provided by the MDDF. In order to accomplish this, Brigadier General Frederic Smalkin, MDDF Commanding General, chartered and established the MDDF Engineer Corps in March of 2006 (Nolan, 2006; Tuxill, 2007).

IDENTIFICATION OF ENGINEERING REQUIREMENTS

The engineer corps was established with the general belief that there was a need for a facility engineering capability, but without specific guidance as to its mission, a prescribed table of allowance, or detail tasking. Mission development to support the National Guard (NG) and MEMA was researched and redefined through a process of interviewing the leadership of those three pillars of the MD MilDep such that the mission of this new engineering unit could be honed, the vision focused and a set of guiding principals developed. This interview process reaffirmed the original perceived need and further identified missions for providing engineering and facility management assistance to the MD MilDep.

The result was to identify four significant areas of responsibility for the newly formed MDDF Engineer Corps to focus on: (1) Installation Status; (2) Damage Assessment; (3) Critical Infrastructure Risk Assessment; and (4) Internal Engineering Capability. The first was to support the NG itself, the next two being in support of the NG's homeland security mission and the final one being in support of the MDDF itself.

Installation Status

As with government agencies at all levels additional requirements are continually being identified, while at the same time funding sources are constrained if not curtailed. This is especially true

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Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE 2007		2. REPORT TYPE		3. DATES COVERED 00-00-2007 to 00-00-2007	
4. TITLE AND SUBTITLE Maryland Defense Force Establishes an Engineer Capability				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) State Defense Force Publication Center,19819 Maycrest Way,Germantown,MD,20876-6339				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES See also ADA494462. Pub in: State Defense Force Journal, Vol. 3, Issue 1, Fall 2007. ? 2008 State Defense Forces Publications Center. Creative Commons Attribution License.					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 10	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

for maintenance and repair of military infrastructure. The funding provided for sustainment, restoration and modernization of NG infrastructure has not kept pace with the increased usage, new emerging requirements and facility degradation due to time and heavy use. Armories, airfields and training facilities are being asked to serve well past their expected lifetimes, and only through increased efficiencies and precise focus for the utilization of facility appropriations can this degradation be held in check.

The U. S. Army has developed the Installation Status Report System (ISR) which is a uniform method of determining the status and condition of facilities and services against common standard; however, this program is time consuming, labor intensive and designed to be executed by laymen, not facility experts. The engineering leadership of the MDARNG expressed concerns (Department of the Army, 2007) as to the consistency of inspections across the numerous and isolated armories across the state. The MDARNG did not have the resources to provide technically knowledgeable and experienced facility engineers to provide the desired consistency of inspection and reporting.

Design of repair and renovation projects is, for the most part, accomplished by Architect and Engineer (A&E) firms on a contract basis; however, both the MDARNG and the MDANG need assistance in the initial development of project concepts, scope of work and preliminary estimates from which design and construction scopes of work can be developed. With the proper documentation including cost estimates of potential projects, identified projects can be forwarded to senior NG leadership and ultimately to the state or federal government for programming and funding. Engineers and architects with prior military experience have the ability, knowledge and experience for the development of these projects in the military environment. Properly documented projects with good cost estimates are critical to the credibility of military leadership when testifying before civilian leadership and requesting financial support (MDDF Engineer Corps, 2007).

Damage Assessment

MEMA has the mission of providing teams for damage assessment for emergency management from either natural or manmade disasters. An important part of disaster assessment is the assessment of critical infrastructure consisting of roads, airfields, bridges and the other public works facilities relied upon for daily life. Not only is there a requirement for disaster assessment for public infrastructure, but a similar assessment must be conducted for utilities and private property. Disaster assessment teams are not, "first responders" in emergency management operations, but need to quickly respond within hours to begin the assessment and documentation to determine if the President will declare an area as a Federal Disaster Area. This declaration will make the identified area eligible for the Federal Emergency Management Agency and other federal assistance programs for disaster relief funding. To quickly and effectively perform assessments the teams must be able to work together, have practiced command and control, understand the scope of assessment, including how to properly document damage, and, most importantly be able to safely operate in a disaster area. Much damage assessment research has been conducted in response to floods and tornadoes (Joyce, 2005; Marshall, n.d.; National Oceanic and Atmospheric Administration, 2003) resulting in some policy development guides (Sinnott, n.d.), field guides (Ohio Emergency Management Agency, 2006) and reporting forms (Sussex County EOC, Lewes, DE, 2005).

Internal Engineering Capability

The MDDF likewise has an internal engineering requirement for its administration and logistics. With little state funding, modifications and repairs to MDDF assigned areas will usually be provided by the newly established Engineer Corps. A recent internal MDDF requirement has been the development of such a requirement; identification of required material and equipment along with liaison with the MDARNG for preparations to relocate the MDDF Headquarters from one facility at the Pikesville Military Reservation to a newly identified facility which is vastly superior to the previously occupied building.

CRITICAL INFRASTRUCTURE RISK ASSESSMENT³

In addition to damage assessment following a catastrophic event, homeland security requires insight into the risk of the critical infrastructure to a natural or manmade disaster. In order to mitigate this potential disaster, Homeland Security operates at four levels: Prevent – Deter – Protect – Respond – Recover. Each level most consider roads, airports, bridges, tunnels, seaports, rail and communications centers, and the other numerous public works facilities that are relied upon for daily life. Not only is there a requirement to assess the public infrastructure, but a similar assessment must be conducted for utilities and private critical infrastructure.

Critical Infrastructure

Critical infrastructure means systems, assets, places or things, whether physical or virtual, so vital that the disruption, incapacitation or destruction of such systems, assets, places or things could jeopardize the health, safety, welfare or security of the nation/state/community, its residents and/or its economy.

Risk Assessment

This is the use of an appropriate mix of security, industry, civil and military engineers, and risk management experts to ascertain, analyze and prioritize risk for each element of the critical infrastructure. This ensures a balanced outcome that is not driven solely by security or operational concerns

Vulnerability Assessment

Vulnerability assessments identify risks in a systematic way; evaluate ways to mitigate consequences; identify risks to better plan future projects; prioritize risks for application of limited resources; and enable security decisions based on a process that is quantifiable and repeatable. The objective of the vulnerability assessment is to determine the potential threat and a reasonable path to reduce identified risks and their consequences.

³ Courtesy of Colonel Eric Rojo (AUS-Ret), previously Director for Critical Infrastructure Risk Assessment for a major international engineering and homeland security consulting firm.

Emergency Planning and Training

Establish an effective emergency planning and training program that includes risk assessment, planning, testing and evaluation, adjustment of plans and procedures, field exercises, and training.

Other aspects of Critical Infrastructure Risk Assessment

- Security Engineering Support.
- Heating, Ventilation and Air Conditioning Security.
- Risk and Security Management Services.

ENGINEER CORPS MANAGEMENT PHILOSOPHY

Following the approach advocated by the Quality Management Program, the Engineer Corps was facilitated through a series of sessions that led to the development of statements of its mission, vision, values, and a preliminary two year plan.

Mission

The MDDF Engineer Corps shall provide: (1) A professional organized, trained and disciplined professional rapid response uniformed volunteer force of engineers of all disciplines to assist the MD MilDep, other state and local government agencies, and civil relief organizations in support of an impending or actual emergency; and (2) An engineering "force multiplier" to the other branches of the MD MilDep.

Vision

The MDDF Engineer Corps shall become: (1) The engineering force of choice to augment of other branches of the MD MilDep because of our reputation for excellence, our demonstrated professional expertise, and our positive "Can Do" approach and attitude of service and ingenuity; and (2) Ready and capable for timely mobilization and response to any emergency that requires engineering expertise such as disaster evaluation and recovery, or technical evaluation and recommendation.

Values

The MDDF Engineer Corps values are expressed in terms of unit, fellow soldier, self; pride in a job accomplished; excellence without arrogance; a willingness to learn everyday; doing the most important things first; and seeking to understand the needs of those we serve before we provide a solution.

Preliminary Two-Year Plan

- **Goal:** Establish liaison with MDARNG, MDANG and MEMA; and Determine internal MDDF engineering requirements.
- **Goal:** Develop training requirements for missions in the following areas: Facility and disaster recovery assessment; Federal Emergency Management Agency organizational, command and

control, and engineer recovery assessment; Military and Department of Defense facility project development and documentation using the DD 1391. (U.S. Army Engineering and Housing Support Center, 1992).

- **Goal:** Assist the MDARNG by providing assistance for facility inspection and evaluation for the annual U.S. Army's Installation Status Report.
- **Goal:** Train disaster assessment teams to support MEMA; Conduct a Field Training Exercise under MEMA command and control; Require that all Engineer Corps personnel achieve the Military Emergency Management Specialist Basic Qualification Badge within six months of joining the Engineer Corps.
- **Goal:** Expand the facility inspection program to provide support to the MDANG.
- **Goal:** Recruitment through: Coordination with engineering and architectural professional organizations; Working with the MDDF Public Affairs Officer to develop a brochure to inform potential candidates of the mission and vision of the Engineer Corps; Presenting an enhanced awareness of the MDDF Engineer Corps to the Baltimore Post of the Society of American Military Engineers; Establishing a web page on the MDDF website; and Establishing liaison with the MDARNG, MDANG, MEMA and State Guard Association of the United States' Maryland Chapter for retired or interested personnel.

Application of the Mission and Vision

Having identified the requirements of the MD MilDep Commanders requiring support and integrating it into the overall mission and vision of the MDDF, the leadership of the newly established MDDF Engineer Corps was able to develop and refine its mission and vision. The mission of this unit was determined to be the provision of an organized, trained, disciplined, professional rapid response uniformed volunteer force of engineers of all disciplines to assist the MD MilDep, state and local government agencies and civil relief organizations in an impending or actual emergency. Through this, the Engineer Corps will act as an engineer "force multiplier," to the other branches of the MD MilDep.

The leadership of the MDDF will know that this mission has been accomplished when this Corps becomes the engineering force of choice by other branches of the MD MilDep due to its reputation of excellence, demonstrated professional expertise, positive "Can Do" approach, and attitude of service and ingenuity. Additionally, the Corps will have demonstrated its ability to be ready and capable of timely mobilization and response to any emergency requiring engineering expertise, such as disaster evaluation and recovery, critical infrastructure risk assessment or technical evaluation/recommendation.

To guide the achievement of its vision, the leadership of the Engineer Corps will imbue values in its Soldiers that reflect the priorities and concepts of unit as follows: unit, fellow soldier, self; pride in a job professionally accomplished; excellence without arrogance; willingness to learn everyday; accomplishing the most important things first; and seeking to understand the needs of those we serve before we provide a solution.

Execution

Established in March of 2006, the MDDF Engineer Corps was envisioned with an ultimate planned manpower of approximately 50 engineers and construction experts. To optimally accomplish the approved mission the organization will be comprised of about 50-percent officers and 50-percent enlisted personnel. Over the past year a carefully selected group of 12 professionals have been recruited and incorporated into the Corps. The desired qualifications of Engineer Corps Soldiers consist of experience and/or education of an engineering or construction background. Previous military experience is factored into the assignment of rank and authority for engineer corps personnel and entering grade or rank is based on experience, both military and civilian, as well as education

The current goal for commissioned personnel consists of about 20 officers with engineering degrees or other technical degrees along with demonstrated experience in the construction industry. For company grade officers, the requirement is for an architectural or engineering discipline such that the degree provides the basic engineering fundamentals. Successful completion of the Fundamentals of Engineering Exam/Engineering in Training Examination is very much desired and provides the needed technical engineering credentials. Engineering technology degrees are acceptable, but limit the officer's ability to be licensed as a registered professional engineer or architect. Field grade officers need significant engineering background with additional management or business background. It is desired that field grade officers have their engineer or architectural license and advanced degree. Again, this will/can not always be the case, but it is the goal (Kelm, January 2007; Kelm, April 2007; Kelm, n.d).

Warrant Officers are construction personnel with demonstrated experience as foremen and project managers with a history of technical construction expertise in multiple areas. Additionally, it is expected that Warrant Officers must have business acumen and construction management experience in their background. They need to be able to coordinate and orchestrate multiple construction skills to complete a project, "on time-on target."

Enlisted Personnel need a construction background and are brought in to the Engineer Corps at one of three levels identified as the Apprentice, Journeyman and Master levels. At the apprentice level construction skills are limited. Personnel with basic construction skills can be MDDF Soldiers with limited training, as well as those who have just graduated from a construction program in high school or a trade school. They are assigned as E-1, E-2 or E-3. With more advanced skills, journeymen construction workers are assigned at the E-4, E-5 or E-6, and are Soldiers who typically have 3-5 years of construction experience. They are expected to be able to fully accomplish any assigned construction task with very limited supervision. Construction personnel who have achieved the master level of construction skills will be assigned at the E-7, E-8 or E-9 and are true experts in their area of construction, be it carpentry, masonry, electrical, heating ventilation and air conditioning, or plumbing. They must be able to perform any construction skill in their area of expertise, and also be able to teach and train MDDF Soldiers they are supervising.

Organization

The Engineer Corps is currently organized as a staff organization with a commander and deputy commander/executive officer. Both the commander and the executive officer are rated engineers. The staff consists of the standard staff codes of administration and manpower (S-1), engineering operations (S-3), training (S-3T) and logistics (S-4). The intelligence (S-2) function is not currently required;

however, it could be incorporated in the future if a contingency requires. With the current complement of 12 personnel, the staff billets have the first priority for manning, line/engineering and construction functions and are performed by the same personnel who man the staff.

The Engineer Corps currently has a centralized structure and drills bi-weekly with the Headquarters of the MDDF at the Pikesville Military Reservation. With the growth of the organization to the ultimate goal of 50 personnel, line organizations will be established as squads within the geographically located Military Support Units across the state. These engineer squads, with a nominal complement of 13 engineers, will function as a military unit within the geographically located Support Unit, with administrative control exercised by the Engineer Corps leadership. Operational control will be provided by the Military Support Unit Commander. These squads will work as an established unit with integrated command and control such that each squad can operate independently or multiple squads could be brought together as an engineer platoon, as conditions dictate. Engineer squads could be tasked as an independent disaster assessment team to support MEMA or could be further broken down into three assessment teams of four persons each under the control of an engineer officer or senior enlisted person.

2006-2007 ACCOMPLISHMENTS

Although not fully up to the desired staffing level, the MDDF Engineer Corps has moved quickly ahead over the past year to meet the needs of the Command and the organizations it supports, as well as taking the necessary steps to bring the Corps well on its way to achieving the stated vision.

Significant training has been accomplished in the area of disaster assessment and emergency management. A major step in the achievement of documented expertise in emergency management has been the development of a training continuum for all engineer personnel at the apprentice, journeyman and master level whether officer or enlisted. This training continuum is additionally broken down into military, technical engineering and emergency management areas. Specifically, as part of the emergency management area, all engineer corps personnel will be qualified as Military Emergency Management Specialists (MEMS) in accordance with the requirements established by the State Guard Association of the United States MEMS Academy Program. At the apprentice level, the basic MEMS qualification is required; at the journeyman level, the senior MEMS qualification is necessary; and a master MEMS qualification is necessary for a master engineer (State Guard Association of the United States, 2007).

To provide direct support to the MDARNG, the MDDF Engineer Corps undertook the inspection of MDARNG armories across the state from February through April 2007. This challenging effort was executed as a core MDDF Engineer mission area. It required the expenditure of 450 man-hours in which one third of the MDARNG's facilities were inspected for deficiencies by MDDF Engineer Soldiers as part of the ISR program (MDDF Engineer Corps, 2007) . In the future, as the MDDF Engineer Corps gains more experience and knowledge of the ISR process, the goal for the Engineer Corps is that the entire program for the MDARNG will be executed by the MDDF. This will include not only the condition of facilities, but the adequacy of services across the spectrum of post operations support.

In the spring of 2007 the MDDF was provided the opportunity to move to a new headquarters facility. The facility proposed consisted of a building that was currently being used as a headquarters

for a MDARNG Field Artillery Battery, and had been constructed early in the 1900s. Originally, this building was built as a stable for the Pikesville Military Reservation, which was the home of the MDARNG Cavalry Troop A. The leadership of the MDDF tasked the Engineer Corps with surveying the existing facility and preparing a concept and design for modifications that would convert it to a facility suitable for the Commanding General's staff and MDDF Headquarters. The basic layout of the building was more than acceptable. Based on work flow and protocol requirements for a senior staff, a plan for proposed modifications and upgrades was submitted and approved. Many work flow modifications to the facility were proposed, such as the removal of non-load bearing walls, and the installation of numerous work counters was initiated. Electrical service was evaluated as well as the condition and capability of other utility services.

With approval of the concept, work began in August of 2007 and was completed with a dedication ceremony hosted by the Maryland Adjutant General on 8 November 2007. Work was accomplished by a combination of MDARNG and MDDF forces with over 1,600 man hours of effort expended by members of the MDDF under the direction and leadership of the MDDF Engineer Corps. The estimated cost of this work was approximately \$100,000 had the work been accomplished by a construction contractor. All work was accomplished through volunteer effort of MDDF Soldiers and material costs were less than \$25,000. Not only was this a successful effort through the accomplishment of mission tasking "On-Time, On-Target," but it was a great team building evolution for the entire Maryland Defense Force.

FUTURE

The future of the MDDF Engineer Corps is bright with vast growth potential. The ISR Program will continue and expand. This program can and should be expanded to support the MDANG for its facilities and airfields. The skills gained and honed by facilities inspections are directly transferable to disaster assessment for MEMA. including the estimated costs of damages. Additional disaster assessment training is required and being programmed for MDDF Engineer Soldiers. A close liaison has been established that will be strengthened through MDDF participation in MEMA disaster recovery exercises. This participation will further enhance interoperability and coordination with MEMA as well as the other pillars of the MD MilDep. With the establishment of the geographically disbursed engineer squads, quick response and local area familiarity will only increase MDDF Engineer responsiveness and efficiency to meet the requirements of those we support. Although not "first responders," engineer disaster assessment teams are already taking courses in civilian emergency response team (CERT) operations such that our engineers will have the rudimentary knowledge of the situation and can stay as responders rather than as victims of a natural or manmade disaster (Federal Emergency Management Agency - CERT, n.d.; Federal Emergency Management Agency - CERT Training, n.d.).

As the Engineer Corps grows and specifically as additional graduate engineers and architects are recruited, the risk assessment of critical infrastructure will be pursued. Through critical infrastructure risk assessment, mitigation of damage can be determined prior to a disaster. If the needed actions determined during the risk assessment are executed, the impact of the disaster on critical services and facilities will be minimized or eliminated. In the vast majority of situations the cost of mitigative actions are significantly less than the cost of recovery efforts from a disaster. The priority for critical infrastructure assessment will be for public facilities and structures, but the same principals can be used to mitigate the damage to critical private property.

CONCLUSION

The MDDF Engineer Corps is already a success, and has had a positive impact on the other pillars of the MD MilDep. It has gained respect and produced measurable results in support of the MDARNG and MEMA. The current rate of growth of the Engineer Corps has been sustainable, resulting in the adequate and timely provision of training as well as the assignment of productive and meaningful work for new recruits as they become MDDF Engineer Soldiers. This sustained growth to an ultimate size of approximately 50 Soldiers will maintain high morale and ensure that the quality of MDDF Engineers is high, allowing and enabling the retention of quality personnel. The future of the Corps is bright; the leadership knows where the organization is going and how it is going to achieve the right track for success.

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